

THURSDAY, OCTOBER 29, 1874

## METEOROLOGY IN FRANCE

WE hail with much satisfaction the movement which has just been made by the French Government in the direction of a more effective organisation than has hitherto existed for the investigation of the meteorology of France. The best results may be expected from the step just taken, which is detailed in the printed documents quoted below,\* and when we consider the great contributions made to practical meteorology by Le Verrier, the distinguished head of the Paris Observatory, in the *Bulletin International*, the *Atlas des Mouvements Généraux de l'Atmosphère*, and the *Atlas des Orages* originated under his direction, we may rest assured that these hopes will be fully realised.

In the decree of February 13, 1873, in which the basis of the reorganisation relative to the meteorology of France was laid down, occurred the following resolutions :—

"1. The investigation of the great movements of the atmosphere and meteorological warnings for the seaports and for agriculture are remitted to the Observatory of Paris.

"2. The working out of the meteorology of the various river-basins of France, and cognate inquiries, is handed over to Commissions representing the different regions and departments of the country, the organising of which the Council of the Observatory is commissioned to prosecute."

In carrying out these resolutions, the meteorological warnings to the seaports were re-established by the Observatory on May 17 of the same year. The duty of issuing meteorological announcements to all departments for the benefit of agriculture, especially in time of harvest, was recognised, and it was at the same time suggested that an inquiry be set on foot with the view of organising a system by which this could be effectually done.

As regards the second resolution, a systematic inquiry into the climate of France had been organised in 1865 by the appointment of Departmental Commissions, and the establishment of a system of observations chiefly by the primary normal schools. At first, when the Departmental Commissions were yet imperfectly organised, it was found necessary to concentrate the observations made over the country in the Observatory of Paris, which undertook their discussion and publication; but this system, which was forced on the Observatory at the time, could not be indefinitely continued with advantage. The grounds for this opinion are stated in these words :—

"From 1869 the Observatory continued to point out that the discussion of the climatic conditions of the different river-basins of France could not be concentrated in Paris with advantage. It seemed necessary that the large body of skilled meteorologists that had been formed during the four years which had elapsed should boldly take the observations into their own hands, in order to discuss them and deduce from them the scientific truths they may be shown to teach. It was not merely from the advantages which would accrue to meteorology itself by adopting this line of action that the effort

towards decentralisation was put forth, but from the intimate bearing which the partition of the work of meteorological inquiry over the whole breadth of the country had on the scientific movement of France, in favouring the spirit of original inquiry and research without which no nation can take a high position in science."

The circumstances which followed hindered the carrying out of these proposals. Subsequently, however, the matter has been resumed and dealt with successfully in several parts of the country, particularly in the basin of the Meuse and over the western sea-board of the Mediterranean, by concerted action on the part of the five departments of Hérault, Gard, Aude, Pyrénées-Orientales, and Lozère. The Astronomical Commission nominated for the purpose of proposing the best measures to be taken in reorganising the astronomical department entered into the same view, and recommended further that inquiries referring to the climate of France be remitted to Regional Committees appointed by departments grouped together according to the river-basins.

"But it must be observed that the proposed institution of Regional Committees will in no way interfere with the Departmental Organisation, but is intended, on the contrary, to give greater weight and vigour to the operations of the Departmental Commissions, in that united action in certain lines of inquiry is thereby facilitated; it being evident that the area embraced by a single department is too small for the proper study of many of the widespread meteorological phenomena which pass across it. The local Commissions have repeatedly drawn attention to this great disadvantage; the organisation by regions will, however, henceforth give to the departments the means of publishing the results of their inquiries in a more complete form. In correcting the system of centralisation which had been carried to so great an excess, it is not intended to leave the Commissions to themselves, with no connecting link between them and the Central Administration. On the contrary, the Observatory of Paris is specially instructed to be in active and fruitful correspondence with the Departmental Commissions, and to give assistance, as far as the Commissions may desire, in organising them by regions."

The programme, thus briefly sketched, has been only imperfectly followed out, solely on account of the pecuniary difficulties. But these difficulties the National Assembly has now removed by authorising the necessary funds. What then is now required, and what is now asked by the Minister of Public Instruction, is that the Prefects enter in the departmental budgets such a sum as may in each case be required by the Commission, and we are glad to learn that there is no doubt that the request will be generally acceded to. M. de Cumont concludes his letter with the remark: "I shall act in concert with my colleague, the Minister of the Interior, in carrying out the propositions of the decree of Feb. 13, 1873, to secure the regular despatch of the meteorological warnings to those departments whose scientific Commissions are put in possession of the requisite funds to enable them to take advantage of the warnings in the interest of agriculture."

In the meantime, the Observatory has hastened the resumption of the publication of the "*Atlas Météorologiques de la France*," which has been stopped for some years. To make up for lost time, the first issue, which is ready for delivery, embraces the three years 1869, 1870, and 1871, and consists of four parts, viz. :—

\* "Letter from M. A. de Cumont, Minister of Public Instruction to the Préfets of the Departments, Paris, October 9, 1874." "Letter from M. Le Verrier, Director of the Paris Observatory, to the Presidents of the Meteorological Commissions of the Departments, Paris, October 9, 1874."

(1) Discussion of the thunderstorms (*orages*) of these years, illustrated with forty-six maps. (2) Hailstorms, with three maps. This part of the work, which is of so much importance to agriculture, has been unfortunately neglected for some time, but is now to be vigorously prosecuted. (3) Report on the climatic observations made in France, and particularly on the distribution of rain, with four maps. (4) Meteorological memoirs and documents (thirteen in all), contributed by different meteorologists of France and other countries, a section of the work which is expected to receive a fuller development in future issues.\*

A noteworthy feature of the publication consists in the fact that the materials which make it up have been collected under the auspices of the Departmental Commissions, and in great part discussed by them. This is, particularly for such a country as France, an admirable arrangement, since there is no European country the working out of the meteorology of which presents a more complex problem, owing to the great diversity of the climates of its different regions; and further, the agricultural interests of no other country would benefit more than those of France, were a correct knowledge of its climate generally disseminated among the people. Now, this feature of the publication gives the local colouring to the reports which is fitted to arrest general attention and secure the putting forth of those local efforts by which alone the meteorology of France can be satisfactorily worked out.

It may be here pointed out that the French meteorological organisation is based on the Commissions which have been appointed in each of the departments; it being to them that the Government, in the decree of Feb. 13, 1873, has remitted the working out of the meteorology of the different river-basins, and inquiries connected therewith. They are invited to unite together for certain objects into Regional Commissions, for the purpose of imparting to their investigations greater breadth and exactness. They are not put under the Central Administration at Paris in the sense of being controlled by it, but are connected with it in order that they may be aided by it in cases where aid is needed. The Departmental Commissions have free automatic action in working out the problem of the local climates of the respective districts which have been entrusted to them.

The programme assigned to the Central Observatory of Paris, consisting of the investigation of the great movements of the atmosphere, and meteorological warnings for the seaports and for agriculture, is too limited in its scope; and we cannot suppose that its illustrious head will be satisfied till he has succeeded in including in the regular work of the Observatory those physical researches we have already strongly advocated in *NATURE* (vol. x. p. 99) as an indispensable part of the work to be undertaken by the Central Meteorological Office of each country, and which have been more recently and ably stated by Prof. Balfour Stewart and Col. Strange (pp. 476 and 490).

In the same article we urged the necessity of the State and the country working together; indeed, in no other way is it possible successfully to work out the great

national questions of storms and of local climates in their bearings on the health, productions, and commerce of the country. In France we see that this essential requisite, of the State and the country working together, has been effected, and it may not be irrelevant to add that the French Government has clearly recognised the position that unaided voluntary efforts are insufficient of themselves to cope with the subject, and that if the undertaking is to be conducted in a manner worthy of the nation and of the ends to be subserved by it, it must be supported with aid from the public funds.

#### MAREY'S "ANIMAL MECHANISM"\*

*Animal Mechanism.* By E. J. Marey. "The International Scientific Series." (London: Henry S. King and Co., 1874.)

#### II.

IN his treatment of aerial locomotion, Prof. Marey has been even more successful than in his investigations with regard to progression on land. Nearly two centuries ago the general principles of this subject were very ably worked out by Borelli, who, after having shown that in the wing the anterior margin is rigid whilst the posterior portions are more and more flexible as they go backwards, inferred, as will be self-evident to all, that in the downward stroke of the flying bird the plane of the wing becomes directed downwards and backwards on account of the hinder margin yielding slightly to the resisting air. It not having struck him that the wing was elastic in its horizontal as well as its vertical direction, Borelli assumed that the stroke was strictly vertical.

By a series of experiments, the logical sequence and convincing power of which are perhaps unequalled in any other extant biological problem, Prof. Marey has been able to demonstrate the effects of the horizontal yieldingness of the wing, and to prove that in insects the stroke, instead of being, as Borelli assumed, a simple vertical line, is a vertical figure of 8. In proof of this original and, at first sight, unexpected observation, he shows that if the tip of the wing of a wasp be gilt, and the insect allowed to buzz in a beam of sunlight, a very elongated vertical figure of 8 image is seen, as in Fig. 1, to be produced by the reflecting tip of the rapidly moving wing; "sometimes, indeed, the wing seems to move entirely in one plane, and the instant afterwards the terminal loops which form the 8 are seen to open more and more. When the opening is very large, one of the loops usually predominates over the other; it is generally the lower one which increases, while the upper diminishes. Indeed, by a still greater opening, the figure is occasionally transformed into an irregular ellipse, at the extremity of which we can recognise a vestige of the second loop."

There is still more to be learnt from this simple experiment. By carefully gilding one surface of the wing alone, the buzzing wing, when intensely illuminated, exhibits the figure of 8 of unequal intensity in its two moieties, as seen in Fig. 1; so that it resembles the figure printed thus, 8, if its thick part be considered to represent that which is most illuminated, and its thin part the darker half. This result can only be produced by the plane of the

\* The price of the volume, post-free to England, is, we understand, 10s. (12 fr.)

\* Continued from p. 500.